AMENDMENTS TO THE CLAIMS

Claims 1-50 (canceled)

Claim 51 (currently amended): A substrate processing apparatus comprising:

a processing vessel for processing a substrate therein, the substrate having a resist film on a surface thereof;

a substrate holding member for holding the substrate in the processing vessel;

a process gas supply section for supplying a process gas into the processing vessel;

a solvent vapor supply section ~~for supplying a solvent vapor into the processing vessel, the solvent vapor supply section~~ having a solvent heater for generating and heating the solvent vapor, a vapor supply line for supplying the solvent vapor into the processing vessel, a vapor heater for heating the solvent vapor flowing through the supply line, a temperature sensor for measuring a temperature of the vapor heater, and an overheat monitoring sensor for monitoring the overheat of the vapor heater;

a main heater for heating the processing vessel; and

means for controlling the solvent heater, ~~and~~ the vapor heater based on the temperature measured by the temperature sensor while monitoring the overheat of the vapor heater through the monitoring sensor and the main heater, to heat the solvent vapor and the substrate within respective temperature ranges in which ~~to control a temperature of the substrate and a temperature of the solvent vapor such that~~ a mixed gas molecular layer of a mixture of molecules of the solvent vapor and molecules of the process gas is formed on the substrate to alter the resist film into a water-soluble substance.

Claim 52 (previously presented): The substrate processing apparatus according to claim 51, further comprising:

a gas flow controller for controlling a supply rate of the process gas into the processing vessel; and

a vapor flow controller for controlling a supply rate of the solvent vapor into the processing vessel.

Claim 53 (previously presented): The substrate processing apparatus according to claim 52, wherein the gas flow controller and the vapor flow controller are controlled by said means for controlling.

Claim 54 (previously presented): The substrate processing apparatus according to claim 52, further comprising a discharge flow controller for controlling a discharge rate from the processing vessel to maintain a pressurized atmosphere in the processing vessel.

Claim 55 (previously presented): The substrate processing apparatus according to claim 51, further comprising a purge gas supply section for supplying a purge gas into the processing vessel to purge the processing vessel of the remaining process gas and solvent vapor.

Claim 56 (previously presented): The substrate processing apparatus according to claim 51, further comprising a hot gas supply section for supplying a hot gas into the processing vessel to heat an atmosphere in the processing vessel.

Claim 57 (previously presented): The substrate processing apparatus according to claim 51, wherein the process gas is an ozone gas and the solvent vapor is a water vapor.

Claim 58 (previously presented): The substrate processing apparatus according to claim 57, further comprising:

a gas flow controller for controlling a supply rate of the ozone gas into the processing vessel; and

a vapor flow controller for controlling a supply rate of the water vapor into the processing vessel.

Claim 59 (previously presented): The substrate processing apparatus according to claim 58, wherein the gas flow controller and the vapor flow controller are controlled by said means for controlling.

Claim 60 (previously presented): The substrate processing apparatus according to claim 58, further comprising a discharge flow controller for controlling a discharge rate from the processing vessel to maintain a pressurized atmosphere in the processing vessel.

Claim 61 (previously presented): The substrate processing apparatus according to claim 57, further comprising a mist trap connected to the processing vessel, the mist trap including:

a cooling unit for cooling the discharged ozone gas and water vapor from the processing vessel to condense the discharged water vapor into a liquid water; and

a discharge unit for receiving and discharging the ozone gas and the liquid water.

Claim 62 (previously presented): The substrate processing apparatus according to claim 61, wherein an ozone killer for killing the discharged ozone gas is connected to the discharge unit, and a drain for the liquid water is provided on a bottom of the discharge unit.

Claim 63 (previously presented): The substrate processing apparatus according to claim 57, further comprising a purge gas supply section for supplying a purge gas into the processing vessel to purge the processing vessel of the remaining ozone gas and water vapor.

Claim 64 (previously presented): The substrate processing apparatus according to claim 57, further comprising a hot gas supply section for supplying a hot gas into the processing vessel to heat an atmosphere in the processing vessel.